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ANNUAL REPORT OF THE METALS AND CERAMICS INFORMATION CENTER.(U)

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DLA900-78-C-1715

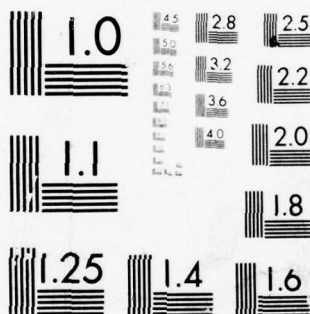
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JUL 1979

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BATTELLE COLUMBUS  
Columbus, Ohio

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Prepared for

ARMY MATERIALS AND MECHANICS RESEARCH CENTER  
Watertown, Massachusetts 02172

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## SUMMARY

The Metals and Ceramics Information Center (MCIC) is one of several technical information analysis centers (IAC's) chartered and sponsored by the Department of Defense (DoD). The objective of the Center is to increase the productivity of scientists, engineers, and technicians engaged in scientific and engineering programs for the DoD. The Center is responsible for the collection, review, analysis, appraisal and summary of the available scientific and technical information and data on selected metals and ceramics and composites containing those materials. The resources and capabilities of MCIC, a full-service IAC, are also available to the technical community at large through an extensive program of products and services.

This first annual report on Contract No. DLA900-78-C-1715 covers the program activities for the period 1 May 1978 through 30 April 1979. Operating statistics and contract status reports are provided for the Fourth Quarter and for the complete reporting period. During this 12-month contract period, the Center met its contractual goal for recovery of products and service costs through direct (98.1 percent) and indirect (1.9 percent) incomes. A substantial portion of MCIC's income continues to come from the special studies and tasks undertaken for Federal agencies; 10 studies/tasks were initiated or performed in this report period. One task was undertaken (with basic contract funds) in support of the Thermophysical and Electronic Properties Information Analysis Center (TEPIAC).

In addition to the information acquisition and processing efforts, technical publications and inquiry services remain the major activities in MCIC's basic program. The Current Awareness Bulletin was continued on a twice-monthly distribution to approximately 5000 technical personnel. The publications completed or in process consist of:

- 28 Current Awareness Bulletins (CAB)
- 6 technical reports
- 3 new handbooks.

The Center continued to give high priority responses to requests for technical assistance (of these incoming requests, 279 were processed and 50 were cancelled). Of the assigned requests, 52 were subject to user charge and 227 were answered free of charge.

Utilizing the RDT&E On-Line System at the Defense Documentation Center, the information base added 3,606 technical documents to the MCIC information system. Included in the annual total are 921 documents accessed in the Fourth Quarter.

Future plans are for the continuation of the primary and established products and services of the Center. The future operations include:

- (1) Keeping the data base and information system current and useful
- (2) Identifying and producing specific products and services needed by the users
- (3) Developing a greater visibility of the Center
- (4) Providing cost-effective service.



## PREFACE

This report was prepared by the Metals and Ceramics Information Center (MCIC) which is operated by Battelle's Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201, under Contract DLA900-78-C-1715. The MCIC program has been administered under the direction of the Defense Logistics Agency with technical supervision by the Army Materials and Mechanics Research Center, Watertown, Massachusetts, Mr. Sam Valencia, Contracting Officer's Technical Representative.

This Annual report covers the period of work May 1, 1978, through April 30, 1979. The Fourth Quarter statistics (February, 1979 through April, 1979) are also included. The report was released by the authors July 1979.

The MCIC and Battelle management express their appreciation to those many sponsor representatives whose advice, guidance and support have been essential to the continuing success of the MCIC program. Particular mention should be made of the significant contributions of

Mr. Joseph Blue, DLA  
Mr. Samuel Valencia, AMMRC

Ms. Frances Burke, DESC  
Mr. Jerome Persh, OUSRDE.

*Rept. for* **ANNUAL REPORT**  
(May, 1978 through April, 1979)

and

**Fourth Quarterly Progress Report** *encl. 4*  
(February through April, 1979)

on the

**OPERATION OF THE METALS AND CERAMICS  
INFORMATION CENTER**

to

**ARMY MATERIALS AND MECHANICS  
RESEARCH CENTER**

## **INTRODUCTION**

In 1971, the Metals and Ceramics Information Center (MCIC) was formed through the merger of the Defense Metals Information Center (DMIC) and the Defense Ceramic Information Center (DCIC). The former had been operated by Battelle since the mid-1950s, and the latter since 1967. Thus, MCIC is continuing more than 2 decades of service to the defense materials community.

As one of the family of technical information analysis centers sponsored by the Department of Defense, MCIC's purpose is to provide an authoritative source of current engineering and scientific information and data on metal and ceramic materials and composites containing those materials which may be applicable to defense systems. Although intended primarily for service to agencies of DoD and their contractors, MCIC's resources are available to the technical community at large, thus contributing to the transfer and adaptation of defense-developed technology for commercial and consumer use.

This report summarizes MCIC activities for the period May 1, 1978, through April 30, 1979, the first 12 months, under Contract DLA900-78-C-1715. It provides a summary of the scope, objectives and organization of MCIC, its information processing and services, and a discussion of future plans for the maintenance of the Center's resource of technical knowledge in metals and ceramics. Statistical summaries of expenditures for the various activities conducted in the fourth quarter and the annual contract period are given in Appendix A (DSAH Form 1261).

Up to 4 additional years of Battelle's operation of MCIC are covered under our current contract.

### **Scope and Purposes of MCIC**

MCIC is recognized as a formal Department of Defense Information Analysis Center (IAC). As such, under the contract reported on herein, its objectives have been to provide scientific and technical information analysis services to the Department of Defense components, contractors and grantees, U.S. Government agencies and their contractors, and to the private sector. The scope includes metals, ceramics in various forms (i.e., bulk, coating or composite) which are utilized in defense systems and hardware with emphasis on critical structural applications and/or stringent environments.

The Center collects and provides its users with information on the design characteristics, applications, processing, fabrication, quality control, environmental effects, test methods, sources, suppliers, and specifications for materials within its scope.

To accomplish these objectives, the MCIC program consists of five principal functions:

- (1) Maintenance of a comprehensive, up-to-date, authoritative Technical Information Base
- (2) Responses to requests for technical advice and assistance from Government agencies, contractors, suppliers, and the public sector
- (3) Issuance of a twice-a-month Current Awareness Bulletin covering metals and ceramic technology on a variety of subjects
- (4) Publication of technical reports, handbooks, databooks, critical reviews and technology assessments appraising the state of the art of metals, ceramics, and processes
- (5) Conduct a variety of special studies for DoD agencies and other departments of the Federal government.

### **Organization of the MCIC Program**

The Metals and Ceramics Information Center is assigned to the Materials Information Program Office of Battelle's Columbus Laboratories. The Manager of that office also serves as Director of MCIC. Members of the permanent MCIC staff are drawn from Battelle's Materials and Information Systems Departments. That full-time staff averages 20 engineers, information specialists and secretarial assistants, who are supported by nearly 100 engineers and scientists from throughout the Columbus Laboratories, contributing on a part-time basis as needed. The fundamental strength of the MCIC program lies in this team of qualified authorities, whose experience and daily participation in advanced materials research provides the Center's users with expert technical advice and authoritative state-of-the-art publications (see Figure 1).

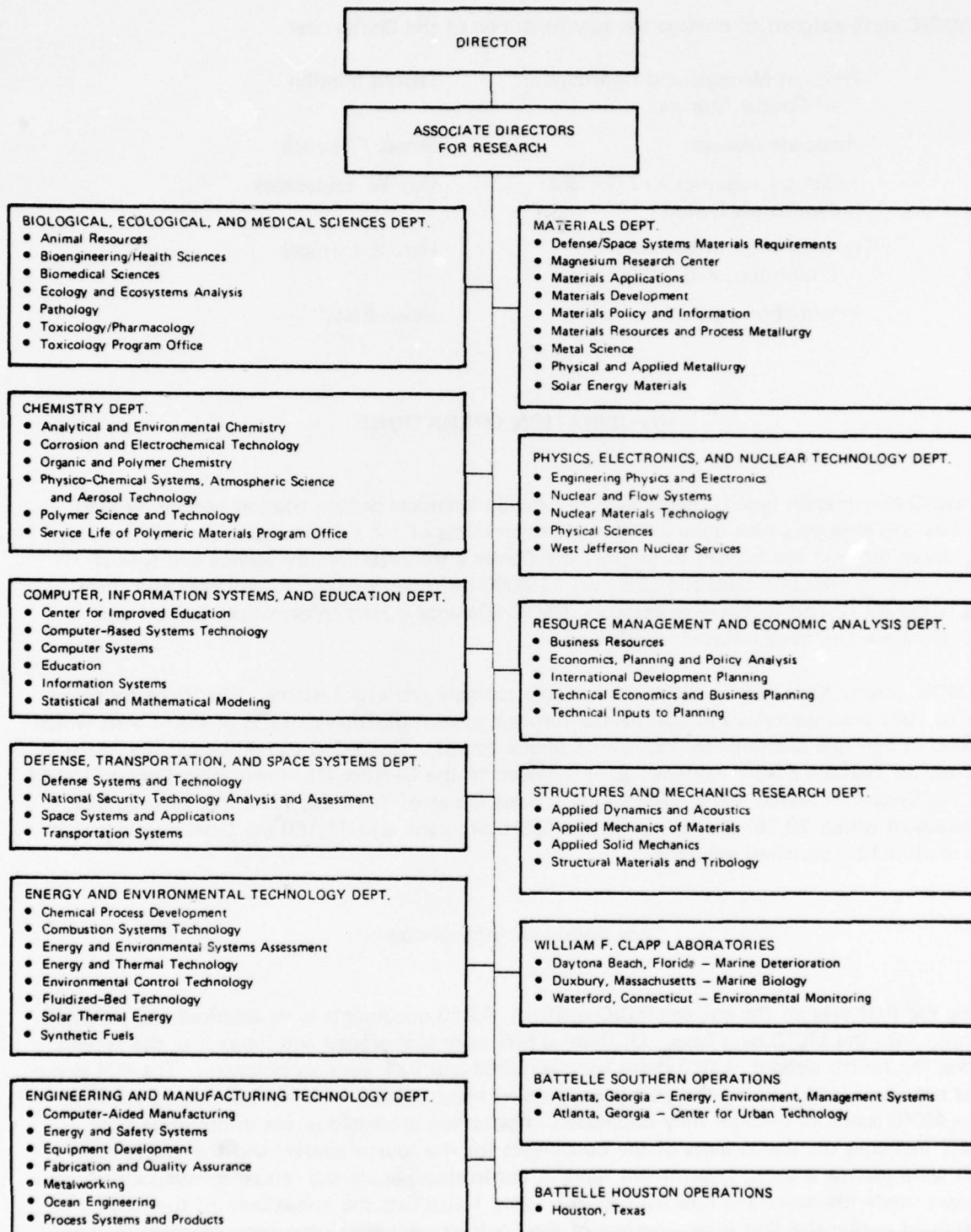


FIGURE 1. TECHNICAL RESOURCES OF BATTELLE AVAILABLE TO MCIC



Key MCIC staff assigned to manage the key functions of the Center are:

Program Manager and Coordinator of Special Studies	Harold Mindlin
Associate Manager	James F. Lynch
Technical Inquiries and Current Awareness Bulletin	Roy W. Endebrock
Coordination of Marketing, Promotion, and Publication	Harold J. Hucek
Information Operations	Helen Pestel

### INFORMATION OPERATIONS

The MCIC information base is maintained to provide technical documentation needed by staff scientists and engineers who compile the various products of the Center and to provide a rapid, inexpensive retrieval mechanism to support the Center's technical inquiry service and special studies. The information base contains over 110,000 documents collected and reviewed since 1955 under MCIC and its two predecessors, DMIC (Defense Metals Information Center) and DCIC (Defense Ceramics Information Center).

The MCIC information base is maintained as two separate retrieval systems. The items collected prior to 1971 are maintained in the manual retrieval system utilizing extracts of documents which are filed in multiple locations by key words (index terms). The MCIC computerized file began in 1971 on the Battelle BASIS System and was moved to the Defense Documentation Center RDT&E On-Line System in March 1975. The computerized file as of April 18, 1979, contains 32,027 references of which 20,867 are unique to the MCIC program, and 11,160 are DDC holdings that were modified by enriched indexing.

### Acquisition of Information

During the first year of the current MCIC contract, 4,010 documents were acquired and reviewed for input into the MCIC data base. Of these 3,606 were accessioned and input into the system. (During the fourth quarter, 1,006 items were acquired and 921 were accessioned.) The 404 documents not accessioned during the year were rejected because they were not considered relevant to the MCIC scope or because they duplicated information presently in the information base. Table 1 indicates the percentages of the documents for the fourth quarter and the yearly total which were journal articles, government reports, conference papers and miscellaneous sources such as books, trade literature and internal papers. Table 1 also lists the breakdown of the items accessioned during the first three quarters of the contract year which has been reported in the quarterly reports.



TABLE 1. MCIC ACQUISITIONS MAY 1978 - APRIL 1979

Document Type	Accessions by Quarter				Percent (a)	Total	Percent (b)
	May-July 78	Aug-Oct 78	Nov 78-Jan 79	Feb-Apr 79			
Journal Articles	437	432	459	473	(51.4)	1801	(49.9)
Technical Reports	260	329	291	341	(37.0)	1221	(33.9)
Air Force	45	127	91	111	(12.0)	374	(10.4)
Navy	45	34	55	98	(10.6)	232	( 6.4)
Army	27	76	28	34	( 3.7)	165	( 4.6)
NASA	50	49	43	47	( 5.1)	180	( 5.0)
ERDA	61	24	34	31	( 3.4)	159	( 4.4)
Other	32	19	40	20	( 2.2)	111	( 3.1)
Technical Papers	100	206	95	99	(10.7)	500	(13.9)
Miscellaneous	<u>27</u>	<u>34</u>	<u>15</u>	<u>8</u>	<u>( 0.9)</u>	<u>84</u>	<u>( 2.3)</u>
TOTAL	824	1001	860	921	(100.0)	3606	(100.0)

(a) Fourth quarter

(b) Annual

Identification and acquisition of pertinent technical literature is aggressively pursued by the MCIC staff. The primary source of reports generated by DoD and other Government agencies is by direct distribution from the contractors or agencies producing the reports. Receiving reports on direct distribution avoids time delays in receipt of this information from secondary sources and allows the Center to have access to interim progress reports not distributed to secondary sources.

Pertinent reports not received on direct distribution are identified and ordered from Government abstracting services including DDC's Technical Abstracts Bulletin (TAB), NTIS' Government Report Abstracts (GRA), NASA's Scientific and Technical Aerospace Reports (STAR), and ERDA's Energy Research Abstracts (ERA).

Journal articles and technical papers are selected from a screening of all materials entering the Battelle Library on a daily basis. This source is supplemented by subscribing to key journals and ordering of individual technical papers by MCIC.

Two to 3 percent of the Center's acquisitions are from sources such as books, trade literature, and trip reports and memoranda on MCIC staff activities which contain technical data.

#### **RDT&E Input**

The MCIC information file is maintained on the Defense RDT&E On-Line System at the Defense Documentation Center. A total of 2,919 of the 3,606 documents accessioned this contract year were processed into MCIC's dedicated data base at DDC. Of the remaining 687 documents, 509 are already in the DDC collection. The DDC records for these reports were supplemented with the MCIC accession number and enriched indexing. The remaining 178 reports were received by MCIC on direct distribution from Government Agencies and Contractors. They are being held for a sufficient time to determine if a DDC record has been prepared for each item. Any report not present in the DDC collection following a waiting period of 2 to 3 months after report distribution is assigned a number in the series for the MCIC collection and added to the data base. Due to computer hardware problems which caused abnormally long processing cycles at DDC from July through April, the waiting period was lengthened to 4 to 6 months to allow more than sufficient processing time for the DDC record.

Fourth quarter statistics for input to the RDT&E System are: 718 items added to the MCIC file, 115 reports in the DDC collections augmented with the MCIC number and enriched indexing, and 88 reports held for the waiting period for checking against the DDC holdings.

#### **TECHNICAL REPORTS AND HANDBOOKS**

The transfer of technical information on advances in materials technology within MCIC's scope and related to applications in defense systems and hardware is an important activity of this program. In response to needs of the Government, particularly DoD, as well as industrial and academic communities, a variety of publications is prepared by the Center. The archival documents include

handbooks/databooks and technical reports which are represented in state-of-the-art reports, proceedings of conferences, critical reviews or technology assessments, as well as comprehensive listings of available literature as related to identifiable areas of interest.

A status summary of the Center's publications activity during the past year is given in Table 2. In this report period one handbook and two technical reports were published and two databook compilations and four technical reports were in process. Of these, one databook volume and three technical reports were started during the past year; one report was started in the last quarter.

A proposed databook volume, "The Handbook of International Compositions and Designations, Volume III, Aluminum", was not initiated last period when it was discovered that the Aluminum Association (AA) had a similar effort under way with a European compiler. After discussions with the AA Publication Committee to determine the feasibility of a cooperative publication effort, a proposal was submitted to AA. A reply is expected after the Publications Committee meets again in June, 1979.

Slippage of work schedules for some of the on going publications resulting from amount of data processed, editorial changes, or receipt of publication materials is a continuing problem and is addressed in Table 2.

A listing of Battelle personnel who contributed to these publications is given in Appendix D.

#### User Feedback

Although the volume of documents sold and the number of inquiries answered can be a measure of performance, a direct response from the user audience would be a more meaningful indication of satisfaction with MCIC's products and services. Consequently, the Center will solicit user feedback through (1) evaluation sheets, (2) telephone survey, (3) incoming correspondence, and (4) personal contacts.

The "MCIC User Evaluation Sheet", which is a modified and approved version of the DLA suggested sheet, was included in all publications of MCIC. The sheets include a business return address to MCIC. All original forms received by MCIC will be copied and forwarded to DLA. Although this is a reversal of procedures suggested by DLA, it will provide MCIC with a more rapid insight of user responses.

A total of 136 evaluation forms for MCIC HB-01, "The Damage Tolerant Design Handbook" and its two supplements have been received from DLA. These responses are the result of a special mailing to obtain a retrospective evaluation from all purchasers of record of HB-01 and its supplements. These forms were analyzed to determine the value to the user and savings to the DoD accrued through use of this Handbook. The results are as follows:

1. A 33 percent return was achieved from 417 recipients of the evaluation sheet.
2. 5 percent of the responses (7) indicated non-applicable.

TABLE 2. STATUS OF MCIC TECHNICAL PUBLICATIONS (APRIL 30, 1979)

Publications	Activity Status <sup>(1)</sup>	Estimated Cost to Complete, \$	Previous/ New	Revised	Remarks
<u>Handbooks/Databooks</u>					
<u>Completed:</u>					
MCIC HB-09V2 International Alloys Compositions, Volume II, Superalloys				1/79	Published <sup>(2)</sup>
<u>In Process:</u>					
Engineering Property Data on Selected Ceramics, Vol. II, Carbides	E	\$15,000	12/78	7/79	(3)
Engineering Property Data on Selected Ceramics, Vol. III, Oxides	TP	14,000	6/79	12/79	
<u>Proposed:</u>					
International Alloy Compositions, Volume III, Aluminum					Negotiating with the Aluminum Association for publication rights
<u>Technical Reports</u>					
<u>Completed:</u>					
MCIC-79-30 A Review of the Status, Selection, and Physical Metallurgy of High-Strength, Low-Alloy Steels				3/79	Published
MCIC-78-38 Bibliography on Composite Materials				10/78	Published
<u>In Process:</u>					
Surface Characterization of Materials	TP	18,500	10/79	—	
Proceedings of the 1978 Tri-Service Conference on Corrosion	P	9,000	6/79 <sup>(4)</sup>	—	Funded by AMMRC
Near-net Shaping of Ceramics	TP	15,000	11/79		
An annotated Bibliography on Silicon Nitride for Structural Applications	E/P	8,000	6/79		New start
<u>Proposed:</u>					
Corrosion Fatigue in Marine Environments		20,000			
Special Welding Technology		23,000			

(1) Legend: TP-technical preparation, TR-technical review, E-editing, P-publication.

(2) Delay in publication caused by larger than expected amount of data to be analyzed for the databook sections and problems with the computer programming caused a delay in final publication.

(3) Delay caused by larger than expected amount of data to be analyzed for the databook/report and extensive technical editorial changes.

(4) Only 31 papers of the 35 presented at the conference in hand. The publication date depends on receipt of the remainder of the papers.



3. 95 percent of the responses (129) indicated a useful document and a savings of \$413,000 per year (\$3200 per user per year).
4. Based on the 1216 copies of the Handbook sold, a simplified analyses indicates an approximate savings of \$3,700,000 per year in engineering effort.
5. Suggested improvements for the Handbook were,
  - a. more detail
  - b. more materials
  - c. more frequent updates.

In general, the responses showed that the Handbook is a valuable engineering tool and also indicated that the probable man-hour savings per year is several times the total investment in the Center each year.

Since the evaluation sheets have been included with each report sold, 25 forms (evaluating 5 handbooks and 11 reports) have been returned. All the forms returned indicated satisfaction with MCIC publications.

The use rate noted varied from once per year to twice a week with the average at about 24 times per year. The savings realized from use of the publications ranged from \$480 per year to infinite with the average savings calculated to be about \$3800 per year. The use of the publications on projects varied from 2 to greater than 10 (most people checked the 2-5 projects box). Eleven forms indicated that the users wanted more detail.

Therefore, this limited evaluation of MCIC reports, handbooks, and databooks indicates that the average publication is useful to about 3.5 projects about 24 times per year and saves the user about \$3800 per year. This conservative evaluation means that the 4976 MCIC publications sold during the past year were used 120,000 times and saved the Government \$19 million on 17,400 projects. Thus, the Department of Defense has realized a return in investment of 25 to 1 for MCIC on publications alone.

The use of the telephone to query selected purchasers of MCIC documents is a new approach for user feedback. This activity will utilize the computerized list of previous MCIC customers described later. A special telephone survey format will be prepared for Battelle staff who will be used to conduct an unbiased survey. This survey will be tailored to the limited funding available on the MCIC program.

#### **CURRENT AWARENESS BULLETIN**

The MCIC Current Awareness Bulletin (CAB) fulfills the MCIC function of alerting the Center's user audience on a timely basis to significant technological developments detailed in acquisitions of all MCIC-scope subjects (metals, ceramics, composites, processes, properties, applications,



markets, etc.). Published twice monthly, each issue highlights important material generally falling within the major headings: Metals, Ceramics, Composites, Corrosion/Compatibility, and MCIC News. The News section features selected symposium and conference schedules, calls for papers, new literature, R&D contract awards (from Commerce Business Daily), and any other items of general interest to the CAB readership.

The MCIC CAB is provided without charge primarily to U.S.-based users. It is available upon request on company or agency letterhead, each subscriber making his own request (no multiple subscriptions). Currently, there are about 5100 subscribers. However, MCIC is aware that copies of CAB are being reproduced for internal company use despite the "without-charge" feature of subscriptions. Issue Number 1 was published January 1, 1977.

Contributors to the technical sections of CAB are Battelle scientists and engineers most of whom are well known in their respective fields of activity. Their chief function is to sift through the extensive MCIC accessions on a regular basis, select the material of greatest interest to the DoD community, and summarize (and sometimes offer personal critiques of) the selections, inserting important data if appropriate to the summaries. The contributors often include information generated by themselves, from their private files, and from attendance at conferences. A listing of the Battelle personnel contributing to the Fourth-Quarter publications is presented in Appendix D.

The CAB format may include the following subject headings:

#### METALS

Light Metals  
Steels  
Stainless Steels  
Superalloys  
Refractory Metals  
Metals Fabrication  
(Metalworking, Joining)  
Net Testing Procedures

#### CERAMICS

Structural  
Refractory  
Special Glasses  
Electronic  
Carbon-Graphite

#### COMPOSITES

Metal Matrix  
Ceramic Matrix  
Carbon/Carbon

#### CORROSION/COMPATIBILITY

#### MCIC NEWS

Meetings/Symposia  
Call for Papers  
Recent Reports & Books  
New R&D Contracts  
Bulletin Credits  
Disclaimers

Publication statistics of the MCIC Current Awareness Bulletin for this Annual reporting period are given in Table 3. A total of 24 issues were published. These represent a total of 244 pages (which includes News sections) and 556 summaries of references.

In addition to CAB, a quarterly periodical co-sponsored by the Metals and Ceramics Information Center and the Metals Properties Council (MPC) has been published and distributed free of charge to MCIC users for many years. Titled "MCIC/MPC Review of the Low-Temperature Properties of Metals", it is authored by Mr. J. E. Campbell, an MCIC consultant and former MCIC staff

TABLE 3. PUBLICATION STATISTICS OF THE MCIC CURRENT AWARENESS  
BULLETIN FOR THE PERIOD, MAY 1978 - APRIL 1979

Quarter	Issue No.	Date	No. of Pages	References Cited (Total = 556)				Total
				Metals	Ceramics	Composites	Corrosion	
1	33	5-5-78	12	12	4	-	3	28
	34	5-19	11	24	3	-	6	33
	35	6-9	8	10	4	-	4	18
	36	6-23	8	9	3	-	4	16
	37	7-7	8	14	-	-	7	21
	38	7-21	8	13	-	-	6	19
	TOTAL		55	91	14	0	30	135
2	39	8-9	12	21	3	2	5	31
	40	8-21	12	21	3	1	4	29
	41	9-8	8	11	4	-	7	22
	42	9-22	8	10	3	-	7	20
	43	10-13	11	18	2	-	3	23
	44	10-27	11	10	2	-	5	17
	TOTAL		62	19	17	3	31	142
3	45	11-10	8	12	1	-	8	21
	46	11-24	8	12	1	-	8	21
	47	12-8	10	15	1	1	5	22
	48	12-22	11	14	2	1	5	22
	49	1-12-79	12	15	1	2	5	23
	50	1-26	12	17	-	3	6	26
	TOTAL		61	85	6	7	37	135
4	51	2-9	12	20	1	2	6	29
	52	2-23	11	17	-	3	5	25
	53	3-9	11	11	2	-	5	18
	54	3-23	8	13	1	-	5	19
	55	4-13	12	18	3	-	6	27
	56	4-27	12	18	2	-	6	26
	TOTAL		66	97	9	5	33	144
GRAND TOTAL			244	364	46	15	131	556
(PERCENT)				(65.4)	(8.3)	(2.7)	(23.6)	

member. The title is descriptive of the scope of materials accessions covered in the quarterly. During this reporting period, four publications were issued and distributed.

## INQUIRY SERVICES

### Technical Inquiries

The direct rapport between inquirer and skilled technical specialist is the most dynamic of the MCIC services. Its development over many years distinguishes MCIC as an Information Analysis Center. Taking advantage of the skilled specialists available at Battelle's Columbus Laboratories, MCIC can place the person with the question in direct communication with a technical authority to rapidly and accurately resolve the inquirer's problem. Answers may be in the form of telephone discussions, letter reports, on-site visits, MCIC reports and handbooks, and on-line computer printouts.

During this annual reporting period, MCIC received 329 requests for technical assistance of which 279 were processed and 50 were cancelled. The effective processing rate was essentially 84.8 percent — significantly higher than the 78.5 percent reported in the previous annual report.\*

Of the completed inquiries, 52 were subject to a user charge and 227 were answered without charge. Ordinarily, each of the no-charge inquiries represented a minimal effort by an MCIC staff member or Battelle engineer, e.g., requiring an hour or less of effort. On the other hand, cancelled inquiries often require MCIC managerial effort in addition to some technical effort in order to provide a cost estimate. A cancelled inquiry is one that has been priced (sometimes, even processed during the cursory evaluation) but not completed because final authorization to proceed was never received by MCIC.

The charges for the 52 service-charge (SC) inquiries ranged from \$40 to \$2369 for a single inquiry and represent a total income of \$18,074. The 227 no-charge (NC) inquiries, credited at \$50 per inquiry, represent a cost of \$11,350; the 50 cancelled inquiries, also credited at \$50 per inquiry, represent a cost of \$2500.

Statistics regarding the technical inquiries processed during the 12-month period are summarized in Table 4. Classification of these technical inquiries is given in Table 5.

Listings of the specific requestors for whom assistance was provided and Battelle-Columbus personnel who were directly involved in technical inquiry services are given in the Appendix sections of the previous quarterly reports. The listings for the fourth quarterly period are given in Appendix Sections B and D, respectively, in this report.

### Nontechnical Inquiries

A significant effort is expended in the course of daily operations in answering a variety of queries unrelated to MCIC's technical scope. In this annual report period, 1263 nontechnical inquiries were answered by MCIC management and supporting staff. A breakdown for the quarterly periods

\*AMMRC TR 78-35 (July 1978).

TABLE 4. TECHNICAL-INQUIRY STATISTICS FOR THE PERIOD,  
MAY 1978 - APRIL 1979

Category	Number of Inquiries Per Quarter												Annual Total No. (Percent)
	1st			2nd			3rd			4th			
	SC(a)	NC(b)	Total	SC	NC	Total	SC	NC	Total	SC	NC	Total	
Industrial	10	50	60	9	45	54	21	43	64	5	44	49	227 (81.4)
Government	1	16	17	-	6	6	2	2	4	4	7	11	38 (13.6)
Foreign	-	5	5	-	2	2	-	2	2	-	2	2	11 (3.9)
Academic	-	-	-	-	-	-	-	2	2	-	1	1	3 (1.1)
Totals, No.	11	71	82	9	53	62	23	49	72	9	54	63	279
Quarterly, percent	13.4	86.6		14.5	85.5		31.9	68.1		14.3	85.7		
On Annual Basis, percent	3.9	25.5	29.4	3.2	19.0	22.2	8.2	17.6	25.8	3.2	19.4	22.6	(100.0)
SC(a) Income, \$18,011	745			1355			10,214			5697			
NC(b) Credit, \$11,350		3550			2650			2450			2700		
Cancelled(c) Inquiries													
Credit, \$2500		100(2)			1250(25)			750(15)			400(8)		(50)
Quarter Subtotals, \$31,811			4345			5255			13,414			8797	
Type of Response													
Technical (non-Biblio)	3	50	53	2	48	50	6	47	53	5	50	55	211 (75.6)
Bibliographic	8	21	29	7	5	12	17	2	19	4	4	8	68 (24.4)
Quarter Totals	11	71	82	9	53	62	23	49	72	9	54	63	279
SC Bibliographic Inq.													36
NC Bibliographic Inq.													32

(a) SC - Service Charge

(b) NC - No Charge

(c) Number in parentheses indicates number of inquiries.



TABLE 5. CLASSIFICATION OF TECHNICAL INQUIRIES PROCESSED BY MCIC  
DURING THE PERIOD MAY 1978 - APRIL 1979

Classification	Number of Inquiries Per Quarter				Annual Total No. (Percent)
	1st No. (Percent)	2nd No. (Percent)	3rd No. (Percent)	4th No. (Percent)	
Materials					
Metals	73 (89.0)	57 (91.9)	64 (88.9)	57 (90.5)	251 (90.0)
Ceramics	8 (9.8)	5 (8.1)	6 (8.3)	6 (9.5)	25 (9.0)
Composites	1 (1.2)	—	2 (2.8)	—	3 (1.0)
Totals	82 (100.0)	62 (100.0)	72 (100.0)	63 (100.0)	279 (100.0)
Technical Scope					
Properties	27 (32.9)	14 (22.6)	22 (30.5)	24 (38.1)	87 (31.2)
Processing	21 (25.6)	20 (32.2)	17 (23.6)	17 (27.0)	75 (26.9)
Applications	9 (11.0)	6 (9.7)	6 (8.3)	7 (11.1)	28 (10.0)
Corrosion	7 (8.6)	6 (9.7)	9 (12.5)	5 (7.9)	27 (9.7)
Markets	4 (4.9)	8 (12.9)	10 (13.9)	5 (7.9)	27 (9.7)
Specifications	6 (7.3)	1 (1.6)	1 (1.4)	4 (6.4)	12 (4.3)
Foreign Equivalents	1 (1.2)	4 (6.5)	4 (5.6)	—	9 (3.2)
Fundamental Behavior	4 (4.9)	1 (1.6)	2 (2.8)	—	7 (2.5)
Test Methods	2 (2.4)	2 (3.2)	1 (1.4)	1 (1.6)	6 (2.2)
Safety	1 (1.2)	—	—	—	1 (0.3)



by the various sectors of the user audience is given in Table 6. The types of inquiries represented questions related to:

- Products and services of the Center
- Quotations on MCIC products/services
- Orders for MCIC reports/handbooks
- Information on CAB and its availability
- Requests for TML, DMIC, and DCIC reports
- Identification and source of Government reports
- Requests for references cited in publications
- Source for acquisition of journal articles
- Source(s) of technical information not in MCIC scope
- Requests for information on former Cobalt Information Center.

Management believes that these contacts are potential additions to MCIC's distribution list.

### **SPECIAL STUDIES/TASKS**

This category was inaugurated to cover tasks which can be described as "super" inquiries. Under separate funding by agencies of DoD through supplements to the basic MCIC contract, these tasks generally require a substantial amount of technical effort extending over a period of time. Each study can involve one or more phases which are assigned to various research staff within Battelle. These tasks are monitored by MCIC whose combination of information and data resources and professional skills in pertinent fields often make it possible to save both time and costs in completing each effort. Through such assignments, the government is able to capitalize further on the substantial investment it has made in the creation of the technical information services.

Table 7 presents a summary of the ten special studies undertaken during this contract period.

In addition, one special task was undertaken in support of the Thermophysical and Electronic Properties Information Analysis Center (TEPIAC) to provide mechanical properties data. This effort is in support of a TEPIAC publication series. Although a great deal of effort has gone into the search for the required data, it appears that much of the data is not available. Letter and telephone contact with various possible information sources is continuing.

TABLE 6. NONTECHNICAL INQUIRY RESPONSES

User Audience	Nontechnical Inquiries Per Quarter				Total	
	1	2	3	4	No.	Percent
Government	27	46	48	32	153	12.1
Industrial	234	150	208	204	796	63.0
Academic	32	23	28	28	111	8.8
Foreign	50	77	65	11	203	16.1
				Total	1263	

TABLE 7. SUMMARY OF SPECIAL STUDIES DURING THIS CONTRACT PERIOD

Title or Description	Contract Modification	Funding Level	Sponsoring Agency	Period of Performance
Carbon/Carbon Composites Materials Evaluate Data	P00002	\$35,000	Air Force/RPL	1 May 1978 - 31 Oct 1978
Establishment of Data Base	P00011	50,000	Air Force/AFML	5 Jan 1979 - (continuing)
	P00012	80,000*	Naval Sea Systems Command	
Manufacturing Technology Plan	P00003/4	85,000	Navy/MAEC	1 May 1978 - 30 June 1979
	P00006	85,000	Navy/NASC	
Silicon Nitride Properties	P00001	6,000*	AMMRC	22 Jun 1978 - 31 Dec 1978
Technical Assistance in Establishment of Army Battlefield Systems	P00001	74,976	AMMRC	22 Jun 1978 - (continuing)
Integration, Base Terminology Data Base	P00013	3,024		
Preparation of Journal for Army Manufacturing Technology Program	P00005	34,370	AMMRC	4 Aug 1978 - (continuing)
	P00009	95,346	AMMRC	
	P00015	11,246	AMMRC	
Publication of Proceedings of Tri-Service Corrosion Conference	P00008	7,855	AMMRC	28 Sep 1978 - 30 Jun 1979
Technical Advisory Services for AMMRC and OUSDRE	P00005	7,000	ARRADCOM	4 Aug 1978 - 30 Apr 1979
		8,500	AMMRC	
Ship Structural Research and Development Requirements	P00007	20,000	Navy/NSROC	11 Sep 1978 - 30 Jun 1979
Fourth Conference on Fibrous Composite in Structural Design	P00010	6,975	AMMRC	10 Nov 1978 - 31 Jul 1979
		18,280**		
Third Army Materials Technology Conference on Ceramics for High-Performance Applications	P00013	24,985*	AMMRC	2 Mar 1979 - 31 Dec 1979

\*Income reported in Table A-1, Appendix A, for Fourth Quarter.

\*\*Fees charged to registrants at Conferences. Required to cover conference expenses, publication of proceedings for authors and attendees.

## MARKETING AND PROMOTION

Marketing of MCIC's products and services was initiated in 1972 as an integral part of the service-charge program. Since that time a list of 61 technical documents (not including CAB) has been generated and is being sold through MCIC's marketing program. At the present time marketing is being conducted by five outlets in addition to MCIC. These agencies, which have a formal marketing agreement with MCIC include:

- NTIS (worldwide)
- American Society for Metals (U.S. only)
- Metal Powder Industries Federation (U.S. only)
- Neutrino/MRI (Japan)
- Allied Publishers Private, Ltd. (India).

In this contract period, 4976 documents were sold for a gross income to MCIC of \$87,256. The documents included 3390 technical reports (\$40,296), 1283 handbooks/databooks (\$37,504), and 303 special documents (\$9,456). During the Fourth Quarter of this contract, 1278 documents were sold for a gross income to MCIC of \$25,474. The documents sold included 755 technical reports, \$8,991; 510 handbooks/databooks (\$16,310); 13 special documents (\$122); and film rentals (\$50). Summary tables listing the various documents sold during the past year and the Fourth Quarter are given in Appendix C.

Two MCIC films have been available for sale or rent during this reporting period. The first MCIC film was a companion to MCIC Report 72-12, entitled, "Scanning Fractures with the Electron Microscope"; and the second film was a companion to MCIC Reports 74-18 and 74-21, "Ceramics and Metals in Medical Prosthetics". The total cumulative sales for the past year and Fourth Contract Quarter for these films are shown below. No new MCIC films are planned for the immediate future.

Film Title	Sales				Total	
	Number		Income, \$		Cumulative	
	Annual	4th Quarter	Annual	4th Quarter	Number	Income, \$
Scanning Fractures with the Electron Microscope						
Rental	4	3	\$ 50.00	\$ 40.00	58	\$ 1375.00
Sales	0	0	—	—	25	<u>3112.50</u>
						\$ 4487.50
Ceramics and Metals in Medical Prosthetics						
Rental	2	1	20.00	10.00	14	\$ 300.00
Sales	<u>0</u>	<u>0</u>	<u>—</u>	<u>—</u>	<u>2</u>	<u>225.00</u>
Total	6	4	\$ 70.00	\$ 50.00	99	\$ 525.00



Statistics on MCIC and NTIS sales are given in Appendix C for the Fourth Quarter — which includes the period October 1978 — April 1979. (NTIS installed a new accounting system and their reports were late; hence, NTIS sales are shown for third and fourth quarters. Their sales records are now up-to-date.

Experience has shown that the sale of MCIC's products and services requires an aggressive promotion effort. Consequently, MCIC has maintained a modest program within the limitations of resources available. The promotional efforts conducted during the Fourth Quarter and the past year are summarized in Tables 8 and 9, respectively. A flexible format was devised to facilitate the generation of promotional literature (flyer) which can be used as inserts in CAB or other mailings.

Special computerized mailing lists were compiled from MCIC sales records. These lists are categorized in the 14 technical interest groups indicated below.

- |                                   |                              |
|-----------------------------------|------------------------------|
| 01 - Corrosion                    | 08 - Fracture Toughness      |
| 02 - Special Metals-Titanium      | 09 - Cryogenics              |
| 03 - Special Metals-Beryllium     | 10 - Turbine Materials       |
| 04 - Special Metals-Superalloys   | 11 - Ceramics                |
| 05 - Mechanical Properties-Metals | 12 - Special Technologies    |
| 06 - Processing                   | 13 - International Materials |
| 07 - Welding                      | 14 - Symposium Proceedings   |

Each buyer on MCIC's sales records was assigned to one or more of the above 14 categories depending upon the subject matter of the report or handbook purchased. The lists will require only a small effort to maintain in the future.

These computer generated lists will be a valuable asset to the future MCIC promotion and marketing effort. The computer files can print our lists by

1. Area of technical interest
2. Report Number (purchases of a given report)
3. Company names alphabetically
4. Zip code number.

The promotional program conducted during the past year has resulted in an income to MCIC of \$88,600 which is a 47.6% increase over 1978 sales income and the highest sales income per year in MCIC history (since 1972). Therefore, this somewhat expanded promotional program will continue with special mailings, inserts in technical journals as book reviews, and special announcements in pertinent trade literature.

TABLE 8. PROMOTION EFFORTS ON MCIC PUBLICATIONS (FOURTH QUARTER)

Report No.	Short Title	Type of Promotion	Publication
MCIC-72-03 -72-06 -74-22	Beryllium	Insert	CAB No. 51, Feb. 14, 1979
MCIC-HB-09V2 & related	Handbook of International Alloy, Vol. II, Superalloys	Insert	CAB No. 52, Feb. 23, 1979
MCIC-77-34 & related	Hot Isostatic Processing	Insert	CAB No. 54, Mar. 21, 1979
MCIC-79-39	A Review of High-Strength, Low-Alloy Steels	Insert	CAB No. 55, April 11, 1979
MCIC-HB-02 & related	Titanium Alloys Handbook	Insert	CAB No. 56, April 25, 1979
MCIC-HB-09V2	Handbook of International Alloys, Vol. II, Superalloys	Publications Announcement	Battelle Today Magazine (Circ. ~45,000)
MCIC-78-36	Ceramic Gas Turbine Demonstration Engine Program	Publications Announcement	Metals Abstracts, Vol. II, November 1978, Page 2083
MCIC - As an Information Center	MCIC Information Brochure distributed at a conference	Technology transfer	International Materials Congress: Materials Aspects of World Energy Needs, March 26-29, 1979, Reston, VA.

TABLE 9. PROMOTION EFFORTS ON MCIC PUBLICATIONS (ANNUAL)

Report No.	Short Title	Type of Promotion	Publication
	List of Technical Publications	Mailed to AMMRC list	Dated May 4, 1978
Special	Materials Technology Conference Proceedings - 1978	Insert	MCIC, Current Awareness Bulletin No. 35 (CAB), June 9, 1978
78-37	Corrosion of Metals in Marine Environments	Book review Book review Book review	Journal of Metals June 1978 Mechanical Engineering June 1978 Journal of the Electrochemical Society June 1978
		Book review	Chemical Engineering Progress June 1978
77-34	Hot Isostatic Processing	Book review	Metal Powder Industries Federation, P/M Bookshelf No. 5 August 1978
77-32	The Effect of Heating on the Properties of Materials	Book review	MPIF, P/M Bookshelf No. 5 August 1978
77-30	Dispersion Strengthening of Metals	Book review	MPIF, P/M Bookshelf No. 5 August 1978
78-34	Hot Isostatic Processing	Book Review	Chemical Abstracts, Vol. 57, No. 7-8, July-August 1978
78-36	Proceedings of the Ceramic Gas Turbine Demonstration Engine Review	Insert	MCIC, Current Awareness Bulletin (CAB) No. 40, August 21, 1978
78-37	Corrosion of Metals in Marine Environments and Related Reports	Insert	CAB No. 41, September 9, 1978
HB-01 & Supplements	Damage Tolerant Design Handbook and 2 Supplements	Insert	CAB No. 42, September 22, 1978
HB-05	Handbook of Soviet Alloy Compositions and related reports	Insert	CAB No. 43, October 10, 1978
MCIC services	Description of MCIC products and services	Insert	CAB No. 42, September 22, 1978 Received 64 requests for more information
HB-03 and related reports	Forging Handbook plus related reports on materials processing	Insert	MCIC Current Awareness Bulletin (CAB) No. 45, Nov. 10, 1978
78-38 and related	Bibliography on Fibers and Composites plus related reports and handbooks	Insert	CAB No. 46, Nov. 22, 1978
HB-06 and HB-08	Two fractography handbooks	Insert	CAB No. 48, Dec. 20, 1978
HB-04 and supplements plus related reports	Handbook on Materials for Superconducting Machinery, its two supplements plus related reports on cryogenics	Insert	CAB No. 49, Jan. 10, 1979
73-13, 73-15 and 74-24	Three MCIC Reports on Welding "Advances in Joining Technology" "Metallurgy of Fusion-Weld Repair" "Automation in Welding"	Insert	CAB 50, Jan. 26, 1979

### Meetings Attended

In support of MCIC's program management, its operations, and technical activities, personnel of both the Center and Battelle's Columbus Laboratories attended 26 meetings during this annual period. Listings of the meetings attended in 1st through 3rd Quarters are given in the respective quarterly reports. The seven meetings attended in the 4th Quarter were as follows:

<u>Personnel</u>	<u>Meeting</u>	<u>Location</u>	<u>Date</u>
H. Mindlin	Aluminum Association [Discussion of International Cross-Index for Aluminum Alloys (w/Hucek)]	Washington, D.C.	February 1979
	Wright-Patterson Air Force Base [Discussion and organization meeting for C/C Data Bank Program (w/Maykuth and Gubiotti)]	WPAFB, Dayton, OH	February 1979
	U.S. Army; Washington, D.C. [Meeting with technical consultants for <i>ManTech Journal</i> to coordinate input procedures (w/Spalsbury)]	Washington, D.C.	March 1979
	American Society for Metals (Discussion regarding marketing of MCIC Handbooks and Data-books and possible cooperative efforts in the future)	Cleveland, OH	April 1979
	AMMRC (Special task discussion with Dr. John Burke; project discussion with S. Valencia)	Watertown, MA	April 1979
C. Green	DDC user Conference	Orlando, FL	April 1979
H. Pestel	ASM Metals Information Committee	Cleveland, OH	March 1979



### Visitors

Eighteen persons visited MCIC during the annual period. Of these 10 were from Government agencies; 4 from industry; 1 from the academia area; and 3 from foreign countries. The latter visitors were concerned with MCIC operations. Of the 18 visitors, 5 were included in the 4th Quarterly period as indicated below. The other visitors are listed in the prior quarterly reports.

<u>Name/Area of Interest</u>	<u>Company/Organization</u>
Sam Valencia, Project discussion	AMMRC
Dale Nelson, MCIC Marketing of USAF Composition Design Guide	WPAFB
Kultida Boon-Itt, showed film and briefly reviewed Center	Thailand Information Center
Mrs. M. M. Murphy, SiN Bibliography	AMMRC
Marshall Froland, MCIC Services	GE

### INCOME AND COST RECOVERY

In compliance with DoD policy, charges for information services have been made since January 1972. The objective of the service-charge program is to recover part, or all, of the costs associated with the output of the Center. The income is intended to offset many costs and to provide for expansion of services to the technical community.

The income achieved by MCIC in the 4th quarter, as well as the total income for the annual period May 1978 through April 1979, was \$174,724 and \$764,377, respectively. A breakout for the income is shown in Table 10.

The total income for the annual period represents 101 percent of the basic funding (\$755,000). In general, the overall income of the period of the program substantially exceeds the contractual goal for the service-charge requirement.

Specifically, the amount of direct income (\$750,082) and the amount of indirect income (\$14,295) represents a cost recovery of 98.1 percent and 1.9 percent, respectively, based on total income. Activities related to MCIC publications, i.e., reports, handbooks, films, and inquiry services, were responsible for 14.5 percent of the income, whereas, the special studies/tasks and associated product sales income accounted for 85.5 percent of the total income.

TABLE 10. MCIC INCOME SUMMARY

Products/Services	Income, \$	
	4th Quarter	Annual Total
Publications:	<u>DIRECT(a)</u>	
Reports	8,991	40,296
Handbooks	16,310	37,504
Films	50	70
Inquiry Services	4,176(b)	9,179(h)
Special Studies/Tasks	143,535(c)	653,557
Miscellaneous	<u>142(d)</u>	<u>9,476</u>
Subtotal	173,204	750,082
	<u>INDIRECT(e)</u>	
Technical Assistance Contracts	1,150(f)	1,150(h)
Other Contracted Activities	0	5,400
In-House Inquiry Services	<u>370(g)</u>	<u>7,745(h)</u>
Subtotal	<u>1,520</u>	<u>14,295</u>
TOTAL	174,724	764,377

(a) Obtained from (1) the sale of publications and services and returned directly to the contract and (2) studies/tasks as supplements to the MCIC contract.

(b) Six inquiries, Nos. 1426, 1429, 1465, 1467, 1458 and 1485 billed by MCIC or NTIS.

(c) Consisting of a new task (\$24,985) and additional funds for existing studies/tasks (\$94,270) received in fourth quarter; task funds not reported previously (\$6000); and registration fee income not included previously (\$18,280).

(d) Supplemental income from special products listed in Table C-3, Appendix C.

(e) Constitutes (1) separately contracted studies for either government or industrial Sponsors and (2) costs of services provided to in-house projects; see Appendix B for identification.

(f) Services on contract DAAG 46-79-A-0120 (AMMRC).

(g) In-house Inquiry No. 1443.

(h) Technical inquiries amounting to \$18,074.

### Mailings

Payment of postal costs for MCIC mailings was effective on 1 May 1978 per instructions from the Defense Logistics Agency. During the Fourth Quarter, 30,548 pieces of mail were processed through the mail facility of Battelle's Columbus Laboratories at a cost of \$2,330.47; the mailings included 912 at 1st Class rate, 28,531 at Bulk rate, and 1105 at Air Parcel Post or 4th Class Book rate. The mailing at Bulk rate was for the Current Awareness Bulletin. A detailed accounting of the postal activity and costs for the annual period is given in Table 11. A total of 123,019 pieces of mail was processed at a mailing cost of \$29,561.81.

**TABLE 11. ANNUAL POSTAL STATISTICS  
(MAY 1978 - APRIL 1979)**

MCIC Operation	Number of Pieces				Cost, \$
	1st Class	3rd Class	Book Rate	Bulk Mail	
Info Input	753	—	48	—	\$ 179.62
Technical Inquiries	73	—	—	—	21.96
Tri Service Corrosion	—	—	25	—	—
CAB	243	86,351	2	28,531*	23,047.21
ManTech Journal	214	—	2,937	—	2,027.60
Marketing & Promotion	1,097	—	1,787	—	4,017.31
Administration	642	1	78	—	226.67
C/C Composites	235	—	2	—	41.44
<b>TOTALS</b>	<b>3,257</b>	<b>86,352</b>	<b>4,879</b>	<b>28,531</b>	<b>\$29,561.81</b>

\*Change to Bulk rate made in 4th Quarter of program to effect a substantial cost savings.

### FUTURE PLANNING

MCIC has completed 8 years of successful operations (1971-1979) under the administrative guidance of the Defense Logistics Agency and the technical guidance of AMMRC. In general, the basic operational procedures that have been developed, refined, and tested over the many years of its effective service to the Department of Defense and its technical community will be continued. Some areas which will be of primary concern in the future operations of MCIC include,

- Keeping the data base and information system current and useful
- Identifying and producing specific products and services for user needs

- Developing a greater visibility of the Center
- Providing effective service despite increasing inflationary costs.

### **Information Operations and Control**

Limitation or reduction of document storage space and continued upgrading of retrieval vocabulary are two areas which require attention in regard to control and implementation of MCIC's storage and retrieval system.

The technical information base which contains over 110,000 documents (1955 to present) is creating a storage problem within the MCIC complex at Battelle. A reduction in the storage space is imperative with respect to a cost-effective information input operation. Consequently, MCIC will plan for a selective purge of older documents and examine the possibility of conversion of the hard-copy documents to microfiche. These tasks will be new activity assignments for the information operations staff to be undertaken as time and resources become available. A period of about 5 years is estimated to process the documents of 1955 to 1970 vintage without an increase in budget. A portion of the necessary funding for this activity may be available from the termination of key-punch operations when a second terminal is provided by DLA for input to MCIC's file at DDC.

The second planned task relates to DDC's plans to eventually make the MCIC information/data base available to all users of the RDT&E On-Line System. Since MCIC transferred its information/data base from Battelle to the DDC computer in 1975, a nominal effort has been made to clean up the index vocabulary for over 30,000 documents to improve effective retrieval of pertinent information from the MCIC file. Employing the same rate of effort as in the past 3 years, the file should be ready for on-line use about 1981.

### **Products and Services**

No major changes in the traditional products and services are planned for the immediate future since such products and services continue to be of interest and usefulness to the MCIC user audience. The initiation of technical conferences as a new approach to information transfer will be pursued when appropriate subject areas are identified. Likewise, MCIC's future publications will be based on technical subject areas that will have been specifically identified as being of significant importance to the DoD and its supporting technical community.

### **Promotion and Marketing**

Continuous promotion of MCIC as a specialized source of evaluated technical information and marketing of the Center's various products and services are recognized as being vital to both mission and future.



The visibility of MCIC in Government and academic communities is appreciably less than in the industrial sector as indicated by requests for products and services. Consequently, increased promotion of these two sectors will be pursued more aggressively in the future through direct contact and selective mailings.

Marketing of products has been significantly improved in the past 2 years through expanded marketing activity in both domestic and foreign areas. To further capitalize on the approach, MCIC is examining methods to make greater use of the American Society of Metals for domestic marketing. Also, we will seek a reputable marketing agent to cover England and the European countries.

Considerable interest has been expressed by foreign clients in the availability of the Current Awareness Bulletin (CAB). Consequently, the dissemination of this periodical as a subscription item to foreign requestors will be considered as a potential source of supplemental income, if DLA approval is obtained.

#### **Operations Management**

With the basic funding at the same level for the past 4 contract years, the maintenance of the present level of products and services presents a continuous problem for MCIC because of inflation. Although adjustments in program activities and operational staff are possible solutions to the problem, a more positive approach will be taken. Consequently, continuing efforts will be made to procure additional funds from the expansion in sales of products and services with special emphasis on special studies/tasks. In addition, a review of personnel assignments and work loads will be made to determine if more cost-effective results can be obtained through the use of the computer.

**APPENDIX A**

**CONTRACT STATUS REPORTS**

APPENDIX A

CONTRACT STATUS REPORTS

FOOTNOTES FOR TABLE A-1

- (a) *According to Battelle definitions of personnel.*
- (b) *Cost of staff time directly related to MCIC operations and special studies/tasks.*
- (c) *Costs other than direct staff time.*
- (d) *Of these, 9 were on a charge basis; see "Inquiry Services" section and Appendix B.*
- (e) *Costs included with technical inquiries.*
- (f) *Two in preparation, one completed this period; see Table 2.*
- (g) *Three in preparation, one completed in this period; see Table 2.*
- (h) *None in process.*
- (i) *Combined activities of (1) Current Awareness Bulletin publication, (2) promotion of MCIC, and (3) marketing and distribution of MCIC technical publications.*
- (j) *See section on "Special Studies/Tasks",*
- (k) *Contractual fee.*
- (l) *Both direct and indirect incomes.*
- (m) *Includes income for Reports, Films, and Miscellaneous categories; see "Income" Table 10.*
- (n) *See Table 7 for income details.*

TABLE A-1.

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT	NAME OF INFORMATION ANALYSIS CENTER MCIC	AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED			COSTS INCURRED			QUARTER ENDING April 30, 1979	CUMULATIVE THRU -- --
				PRO- (a) FESSIONAL	NON-PRO (b) FESSIONAL	TOTAL	DIRECT (b)	INDIRECT (c)	TOTAL		
				1,050	1,766	2,816	24,740	34,587	59,327		
1. ACQUISITION AND INPUT OF SOURCE INFORMATION											
a. DOCUMENTS ACQUIRED	1,006										
b. DOCUMENTS REVIEWED	1,006										
c. DOCUMENTS CATALOGED	921										
2. TECHNICAL INQUIRY RESPONSES PROVIDED (d)	55			233	359	592	5,544	7,387	12,931		5,696 (l)
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED (d)	8			—	—	—	—	—	(e)		
4. HANDBOOKS/DATA BOOKS COMPLETED (f)				273	15	288	5,875	15,333	21,208		16,310
a. NEW CHAPTERS/PAGES COMPLETED	—										
b. REVISED CHAPTERS/PAGES COMPLETED											
c. DATA SETS COMPILED											
5. STATE-OF-THE-ART STUDIES COMPLETED (g)	1			240	149	389	4,648	10,908	15,556		9,183 (m)
6. CRITICAL REVIEWS AND/OR TECHNOLOGY (h) ASSESSMENTS COMPLETED	—			—	—	—	—	—	—		—
7. CURRENT AWARENESS AND PROMOTION EFFORTS/ Marketing (i)				458	932	1,390	13,703	31,464	45,167		—
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	7/5										
b. NUMBER MEETINGS, CONFERENCES, ETC SUPPORTED	7										
8. OTHER Special Studies and Tasks (i)	3			1,984	965	2,949	36,102	74,542	110,644		143,535 (n)
9. MANAGEMENT AND SUPPORT				489	516	1,005	14,429	20,461	34,890		
10. UNASSIGNABLE INDIRECT COSTS (k)				—	—	—	—	13,725	13,725		
11. TOTAL				4,727	4,702	9,429	105,041	208,407	313,448		174,724



TABLE A-2.

INFORMATION ANALYSIS CENTER CONTRACT STATUS REPORT		NAME OF INFORMATION ANALYSIS CENTER MCIC				QUARTER ENDING			CUMULATIVE THRU April 30, 1979	
AREA TITLE	OUTPUT UNITS PRODUCED	MANHOURS EXPENDED			COSTS INCURRED			INCOME		
		PRO- FESSIONAL	NON-PRO- FESSIONAL	TOTAL	DIRECT	INDIRECT	TOTAL			
1. ACQUISITION AND INPUT OF SOURCE INFORMATION		4,019	6,592	10,611	95,719	134,754	230,473			
a. DOCUMENTS ACQUIRED	4,010									
b. DOCUMENTS REVIEWED	4,010									
c. DOCUMENTS CATALOGED	3,606									
2. TECHNICAL INQUIRY RESPONSES PROVIDED	211	1,211	971	2,182	26,875	34,462	61,337	18,074		
3. BIBLIOGRAPHIC INQUIRY RESPONSES PROVIDED	68	—	—	—	—	—	—	—		
4. HANDBOOKS/DATA BOOKS COMPLETED		1,706	859	2,565	31,366	58,189	89,855	37,504		
a. NEW CHAPTERS/PAGES COMPLETED	3/405									
b. REVISED CHAPTERS/PAGES COMPLETED	—									
c. DATA SETS COMPILED	—									
5. STATE-OF-THE-ART STUDIES COMPLETED	2	871	1,024	1,895	19,790	41,566	61,356	49,842		
6. CRITICAL REVIEWS AND/OR TECHNOLOGY ASSESSMENTS COMPLETED	—	—	—	—	—	—	—	—		
7. CURRENT AWARENESS AND PROMOTION EFFORTS		2,468	4,856	7,324	78,016	161,281	239,297	5,400		
a. NUMBER NEWSLETTERS AND/OR ANNOUNCEMENTS PUBLISHED	28/13									
b. NUMBER MEETINGS, CONFERENCES, ETC. SUPPORTED	24									
8. OTHER Special Studies	10	5,402	1,814	7,216	79,386	225,240	304,626	653,557		
9. MANAGEMENT AND SUPPORT		1,868	2,040	3,908	56,725	74,913	131,638			
10. UNASSIGNABLE INDIRECT COSTS		—	—	—	—	51,887	51,887			
11. TOTAL		17,545	18,156	35,701	388,177	782,292	1,170,469	764,377		

**APPENDIX B**

**ORGANIZATIONS SERVED BY MCIC (4th QUARTER)**

## APPENDIX B

## ORGANIZATIONS SERVED BY MCIC (4th QUARTER)

<u>Inquiry Number</u>	<u>Organization and Person</u>	<u>Bibliographic</u>	<u>Service Charge</u>	<u>No Charge</u>
	<b>Industrial</b>			
1426	Mr. C. Gillespie John B. Moore Corp. South Amboy, New Jersey	X	X	
1429	Mr. D. Birkholz Dresser - Clark Olean, New York		X	
1442	Mr. D. Trott Battelle-Columbus Columbus, Ohio	X		X
1443	Mr. J. Varga Battelle Columbus Columbus, Ohio		X	
1445	Mr. F. Bailey Bailey Burners Haskell, New Jersey			X
1446	Mr. L. Wilbur Western Gear Jamestown, North Dakota			X
1448	Mr. R. Carbonara Battelle Columbus Columbus, Ohio	X		X
1449	Mr. B. Patterson Southern Research Institute Birmingham, Alabama			X
1451	Void			
1452	Mr. R. Fellows Syston Donner Berkeley, California			X
1453	Mr. J. Clem Lord Kinematics Erie, Pennsylvania			X

<u>Inquiry Number</u>	<u>Organization and Person</u>	<u>Bibliographic</u>	<u>Service Charge</u>	<u>No Charge</u>
<b>Industrial (Continued)</b>				
1454	Mr. D. Drikelo U. S. Steel Research Center Pittsburgh, Pennsylvania			X
1455	Mr. D. Maden Boeing Seattle, Washington			X
1456	Ms. S. Harvey Metcat Associates Cincinnati, Ohio			X
1457	Mr. L. Liu General Electric Burlington, Vermont			X
1459	Mr. W. Gerlach TRW Orlando, Florida			X
1460	Ms. S. Vernon Adaptronics MacLean, Virginia			X
1461	Dr. J. Nickerson Schlumberger Well Services Houston, Texas			X
1462	Mr. H. Pintell Interelectronics Congers, New Jersey			X
1463	Mr. R. McDermott W. R. Grace Detroit, Michigan	X		X
1465	Mr. R. Pesola Raytheon Co. Portsmouth, Rhode Island		X	
1467	Mr. J. Hunt Polymet Corp. Cincinnati, Ohio	X	X	
1469	Mr. D. Krentz Du Pont Wilmington, Delaware			X



<u>Inquiry Number</u>	<u>Organization and Person</u>	<u>Bibliographic</u>	<u>Service Charge</u>	<u>No Charge</u>
<b>Industrial (Continued)</b>				
1470	Mr. H. Hanes Conaway Pressure Systems Columbus, Ohio			X
1471	Mr. G. Khanna Great Lakes Carbon Corp. New York, N. Y.			X
1472	Mr. J. Gubbay Honeywell Electro-Optics Lexington, Mississippi			X
1473	Mr. J. Clark Battelle Columbus Columbus, Ohio			X
1474	Mr. W. Connors Sundstrand Rockford, Illinois			X
1475	Mr. L. Greenspan RCA Lancaster, Pennsylvania			X
1476	Mr. T. McGinty Vought Dallas, Texas			X
1477	Dr. H. Rosenberg Timet Pittsburgh, Pennsylvania			X
1478	Mr. J. Picco Sundstrand Aviation Rockford, Illinois			X
1479	Mr. J. Beavers Battelle Columbus Columbus, Ohio			X
1480	Mr. E. Pisarz Honeywell Ft. Washington, Pennsylvania			X
1482	Mr. H. Hanes Conaway Pressure Systems Columbus, Ohio			X

<u>Inquiry Number</u>	<u>Organization and Person</u>	<u>Bibliographic</u>	<u>Service Charge</u>	<u>No Charge</u>
<b>Industrial (Continued)</b>				
1484	Mr. W. Connors Sundstrand Aviation Rockford, Illinois			X
1486	Mr. M. Schnitzer Cameron Iron Works Houston, Texas			X
1487	Mr. D. Marshall Aerospace Research Applications Center Indianapolis, Indiana			X
1488	Dr. J. Blocker Battelle Columbus Columbus, Ohio			X
1489	Mr. E. Wilner Lockheed Missiles & Space Sunnyvale, California			X
1493	Mr. S. Fogle Wm. Powel Co. Cincinnati, Ohio			X
1494	Ms. B. Banek Inland Steel East Chicago, Illinois			X
1495	Mr. D. Hayes U. S. Steel Pittsburgh, Pennsylvania			X
1496	Mr. C. Cozens Sargent Industries Los Angeles, California			X
1497	Mr. P. Kloeris Hughes Helicopters Culver City, California			X
1498	Mr. G. Bennett Northrop Aircraft Group Hawthorne, California			X

<u>Inquiry Number</u>	<u>Organization and Person</u>	<u>Bibliographic</u>	<u>Service Charge</u>	<u>No Charge</u>
<b>Industrial (Continued)</b>				
1499	Ms. S. Seruga Pfizer Co. Easton, Pennsylvania			X
1500	Mr. H. Sayell General Electric Philadelphia, Pennsylvania			X
1501	Mr. J. Allison Atwood & Morrill Salem, Massachusetts			X
1503	Mr. F. Bishop Sargent Industries El Segundo, California			X
<b>Government</b>				
1434	Mr. P. Smoot AMMRC Watertown, Massachusetts	X	X	
1447	Mr. P. Smoot AMMRC Watertown, Massachusetts	X	X	
1450	Mr. D. Kahan National Bureau of Standards Washington, D. C.			X
1458	Mr. J. March ASAL/TSR/M Wright-Patterson AFB, Ohio		X	
1464	Mr. F. Williams Naval Air Development Center Warminster, Pennsylvania			X
1466	Ms. S. Oberc NASA Lewis Research Center Cleveland, Ohio			X
1468	Mr. A. Bedo NASA Technology Transfer (University of Pittsburgh) Pittsburgh, Pennsylvania			X

<u>Inquiry Number</u>	<u>Organization and Person</u>	<u>Bibliographic</u>	<u>Service Charge</u>	<u>No Charge</u>
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**Government (Continued)**

1483	Ms. K. Kissinger Johnson Space Flight Center Houston, Texas			X
1485	Ms. J. Harris Army Research Office Research Triangle Park, N. C.	X	X	
1490	Mr. T. Jones Los Alamos Scientific Laboratory Los Alamos, N. M.			X
1502	Mr. T. Sember NASA Technology Transfer (University of Pittsburgh) Pittsburgh, Pennsylvania			X

**Academic**

1481	Dr. J. Boydan Purdue University West Lafayette, Indiana			X
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**Foreign**

1444	Mr. L. Gypen Katholieke Universiteit Heverlee, Belgium			X
1491	Mr. M. Davidson Rolls-Royce Coventry, England			X



**APPENDIX C**

**ANNUAL AND 4TH QUARTER SALES  
OF MCIC REPORTS, HANDBOOKS AND SPECIAL REPORTS**

TABLE C-1. ANNUAL SALES OF MCIC TECHNICAL REPORTS (MAY 1, 1978-APRIL 30, 1979)  
WITH SALES INCLUDED FOR THE FOURTH QUARTER (FEBRUARY 1, 1979-APRIL 30, 1979)

Docu- ment	Document Title	Reports	Number Sold (NTIS)		Number Sold (MCIC)		Number Sold (Total)		Number Sold (CUMUL)
			Annual	Quarter 3&4	Annual	Quarter 4	Annual	Quarter	
7101	EFF OF SURF COND ON MECH PROP TI-ALLOYS	AUG71	3	3	17	2	20	5	938
7102	EFF SHOT PEEN ON IMP. FAT-STR CORR PROP	DEC71	2	2	63	7	65	9	1065
7203	NONTRADITIONAL MACHINING OF BERYLLIUM	JAN72	0	0	11	4	11	4	231
7204	CRACK BEHAVIOR IN D6AC STEEL	JAN72	1	1	6	0	7	1	390
7205	SYMP ON PROP OF ELECT DEP METALS	JAN72	0	0	16	3	16	3	885
7206	IMPURITY EFFECTS IN BERYLLIUM	MAR72	0	0	6	2	6	2	131
7207	OXIDATION OF FENI + COBALT BASE ALLOYS	JUN72	0	0	183	5	183	5	564
7208	HOT CORROSION IN GAS TURBINES	JUN72	4	4	197	5	201	9	605
7209	BIBLIO ON FIBERS + COMP MATLS 1969-72	JUL72	3	3	30	4	33	7	624
7210	SUPERALLOYS-PROCESSING (CONF PROC.)	SEP72	4	4	28	10	32	14	556
7211	BETA TITANIUM ALLOYS	SEP72	0	0	10	0	10	0	308
7212	FRAC ANAL BY SCANNING ELEC MICROSCOPY	DEC72	5	5	55	15	60	20	1482
7313	ADV IN JOINING TECH - 604S + BEYOND	JAN73	19	19	75	56	94	75	758
7314	MATLS FOR USE IN AIRCRAFT GAS TURB ENG	JUN73	3	3	35	3	38	6	630
7315	METALLURGY OF FUSION-WELD REPAIR	AUG73	16	16	91	76	107	92	630
7316	TITANIUM CASTING TODAY	DEC73	0	0	13	4	13	4	256
7319	PROC 72 TRI-SERV CONF ON CORROSION	DEC73	10	10	6	2	16	12	362
7417	PROC 73 SYMP ELEC-DEP METAL SEL APPLI	APR74	1	1	9	1	10	2	386
7418	METAL IMPLANTS FOR ORTHO + DENTAL SURG	FEB74	1	1	24	0	25	1	462
7420	PROPERTIES OF TEXTURED TITANIUM ALLOYS	JUN74	4	11	14	3	18	7	214
7421	CERA PROSTH APPL-ORTHODONTAL-CARDIOV	JUL74	3	3	29	4	32	7	225
7422	NONDESTRUCTIVE TESTING OF BERYLLIUM	JUL74	1	1	14	3	15	4	82
7423	CORROSION OF METALS IN THE ATMOSPHERE	AUG74	6	6	35	12	41	18	510
7424	AUTOMATION IN WELDING	OCT74	16	16	54	32	70	48	279
7525	CRACKS AT STRUCTURAL HOLES	MAR75	0	0	13	1	13	1	227
7526	TITANIUM INDUSTRY IN THE MID 70S	JUN75	0	0	30	2	30	2	313
7527	PROC 74 GAS TURB MATLS N MAR ENVIR CONF	JUL75	0	0	23	5	23	5	277
7628	PROC + APPLI OF DEPL URAN ALLOY PROD	SEP76	5	5	21	10	26	15	74
7729	ANNOT BIBLIO SIL NIT FOR STRUC APPLI	MAR77	6	3	56	2	62	8	188
7730	DISPERSION STRENGTHENING OF METALS	APR77	30	4	102	17	132	47	244
7731	LOW TEMP PROP SEL MATLS-BIBLIO W/DESCR	MAY77	8	6	94	10	102	18	155
7732	EFF RAP HEAT PROP MATLS-BIBLIO W/DESCR	JUN77	6	4	146	7	152	13	222
7733	PROC 76 TRI-SERV CONF ON CORROSION	DEC77	30	14	141	10	171	40	171
7734	HOT ISOSTATIC PROCESSING	NOV77	37	21	521	76	558	113	668
7835	RHEOCASTING	JAN78	24	13	128	25	152	49	153
7836	PROC DARPA/NAVSEA CER GASTURB DEM	MAR78	35	27	369	24	404	59	604
7837	CORROSION OF METALS IN MARINE ENVIRO	MAR78	38	27	284	30	322	68	322
7838	BIBLIO ON FIBERS + COMPOSITE MATLS	NOV78	0	0	119	56	119	56	119
7939	REVIEW METALL HI-STREN LOW-ALLOY STEEL	APR79	0	0	1	1	1	1	1
TYPE TOTAL			321	226	3069	529	3390	755	16310

TABLE C-2. ANNUAL SALES OF MCIC HANDBOOKS AND DATABOOKS (MAY 1, 1978-APRIL 30, 1979)  
WITH SALES INCLUDED FOR THE FOURTH QUARTER (FEBRUARY 1, 1979-APRIL 30, 1979)

Docu- ment	Document Title	Reports	Number Sold (NTIS)		Number Sold (MCIC)		Number Sold (Total)		Number Sold (CUMUL)
			Annual	Quarter 3&4	Annual	Quarter 4	Annual	Quarter	
H801	DAMAGE TOLERANT DESIGN HANDBOOK	DEC72	0	0	65	14	65	14	1230
H801S1	1ST SUPP TO D-T-D HANDBOOK	DEC73	0	0	60	16	60	16	747
H801S2	2ND SUPP TO D-T-D HANDBOOK	JAN75	0	0	67	13	67	13	634
H802	TITANIUM ALLOYS HANDBOOK	DEC72	1	1	44	6	45	7	973
H803	FORGING-EQUIP. MATLS. + PRACTICES	OCT73	110	57	113	25	223	82	1327
H804	HDBK ON MATLS FOR SUPERCONDUCTING MACH.	NOV74	0	0	41	20	41	20	364
H804S1	1ST SUPP TO HDBK ON M-S-M	NOV75	6	5	46	21	52	26	239
H804S2	2ND SUPP TO HDBK ON M-S-M	JAN77	7	4	44	24	51	28	182
H805	SOVIET ALLOY HANDBOOK	FEB75	0	0	62	17	62	17	617
H805S1	1ST SUPP TO SOVIET ALLOY HDBK	APR76	10	3	105	30	115	33	253
H806	SEM/TEM FRACTOGRAPHY HANDBOOK	DEC75	10	8	111	42	121	50	817
H807V1	ENGRG PROP DATA ON CERAMICS-V1 NITRIDES	MAR76	17	8	83	9	100	17	420
H808	ELECTRON FRACTOGRAPHY HANDBOOK	JUN76	9	5	77	35	86	40	338
H809V1	HDBK OF INTNL ALLOY COMP+DESIG-V1 T1	NOV76	10	3	62	21	72	24	299
H809V2	HDBK INTNL AL. COMP+DES- V2 SUPERALLOY	DEC76	0	0	123	123	123	123	123
TYPE TOTAL			180	94	1103	416	1283	510	8563

TABLE C-3. ANNUAL SALES OF MCIC SPECIAL REPORTS (MAY 1, 1978-APRIL 30, 1979)  
WITH SALES INCLUDED FOR THE FOURTH QUARTER (FEBRUARY 1, 1979-APRIL 30, 1979)

Docu- ment	Document Title	Reports	Number Sold (NTIS)		Number Sold (MCIC)		Number Sold (Total)		Number Sold (CUMUL.)
			Annual	Quarter 3&4	Annual	Quarter 4	Annual	Quarter	
AMTC4	AMMRC BOOKS - AMTC NO 4 - JOINING	76	0	0	12	0	12	0	156
AMTC5	AMMRC BKS - CERAMICS FOR HI PERF APPL	78	0	0	34	0	34	0	34
HELRG2	SURVEY ON MECH PROP ON RAPID HEATING	JUL76	0	0	6	0	6	0	6
MTCT8	1978 MATERIALS TECHNOLOGY REPORT	FEB78	0	0	245	9	245	9	245
SR7501	MATERIALS SHORTAGE WORKSHOP PROCEEDINGS	FEB75	0	0	3	3	3	3	148
SR7606	WORKSHOP ON GOVT POLICIES + PROGRAMS	MAR76	0	0	1	1	1	1	286
STC76	1976 STRUCTURES TECHNOLOGY REPORT	NOV76	0	0	2	0	2	0	351
TYPE TOTAL			0	0	303	13	303	13	1226



**APPENDIX D**

**TECHNICAL PERSONNEL ASSOCIATED WITH  
MCIC PRODUCTS & SERVICES (4th QUARTER)**

## APPENDIX D

**TECHNICAL PERSONNEL ASSOCIATED WITH  
MCIC PRODUCTS & SERVICES (4th QUARTER)**

Personnel	Titles	Area of Specialization
	<b>Inquiries</b>	
Bartlett, E. S.	Staff Metallurgist	Refractory Metals
Bennett, F. C.	Staff Metallurgist	Casting Technology
Berry, W. E.	Staff Scientist	Corrosion
Campbell, J. E.	MCIC Consultant	Fracture Mechanics
Duckworth, W. H.	Staff Scientist	Ceramics
Endebrook, R. W.	Information Manager	Information Handling
Ford, S. C.	Staff Scientist	Fatigue of Alloys
Glaeser, W. A.	Staff Engineer	Friction & Wear
Green, C. W.	Information Specialist	Information Handling
Groeneveld, T. P.	Staff Metallurgist	Steel Technology
Gurklis, J. A.	Staff Scientist	Electrochemical Processing
Hucek, H. J.	Information Manager	Information Handling
Johnson, D. M.	Information Specialist	Information Handling
Lennon, J. W.	Staff Ceramist	Ceramics
Lynch, J. F.	MCIC Assoc. Manager	Information Handling
Maykuth, D. J.	Staff Metallurgist	Cobalt Technology
Mindlin, H.	MCIC Manager	Information Handling
Pestel, H. C.	Information Manager	Information Handling
Roach, D. B.	Staff Metallurgist	Stainless Steel Technology
Ruff, P. E.	Staff Engineer	Mechanical Properties of Metals
Vanecho, J. A.	Staff Metallurgist	Creep Properties of Metals
Wood, R. A.	Staff Metallurgist	Titanium Technology

Personnel	Titles	Area of Specialization
<b>Current Awareness Bulletin</b>		
Bartlett, E. S.	Staff Metallurgist	Superalloys, Refractory Metals
Berry, W. E.	Staff Scientist	Corrosion
Boulger, F. W.	Staff Scientist	Metalworking
Campbell, J. E.	MCIC Consultant	Metals Properties, Steels, Testing
Duckworth, W. H.	Staff Scientist	Ceramics
Endebrook, R. W.	Materials Engineer	CAB Manager/Editor
Evans, R. M.	Staff Engineer	Metals Joining
Gurklis, J. A.	Staff Scientist	Metals Finishing
Johnson, D. M.	Information Specialist	Contract Awareness
Lynch, J. F.	Staff Ceramist	Ceramics
Maykuth, D. J.	Staff Metallurgist	Composites
Messing, G. L.	Staff Ceramist	Ceramics
Norz, B. E.	Senior Technical Typist	Manuscript Preparation
Shillito, K. R.	Staff Scientist	Ceramics
Williams, D. N.	Staff Scientist	Aluminum, Zirconium
Wills, R. R.	Staff Scientist	Ceramics
Wood, R. A.	Staff Metallurgist	Titanium
<b>Technical Reports</b>		
Fletcher, E. E.	Staff Engineer	Ferrous Metallurgy
Johnson, D. M.	Information Specialist	Information Analysis
Carbonara, R. S.	Staff Engineer	Material Analysis
<b>Handbooks/Databooks</b>		
Hucek, H. J.	Staff Metallurgist	Mechanical Properties and Physical Metallurgy of Ferrous Metals

Personnel	Titles	Area of Specialization
<b>Handbooks/Databooks (Continued)</b>		
Maykuth, D. J.	Staff Engineer	Physical Metallurgy and High-Temp. Metallurgy
Morral, F. R.	Consultant	High-Temperature Materials
Thompson, J. K.	Staff Engineer	Mechanical and Properties
Wahl, M. J.	Consultant	Information Analysis and Nomenclature of Materials
<b>ManTech Journal</b>		
Spalsbury, W. A.	Researcher	Information Analysis



Army Materials and Mechanics Research Center  
Watertown, Massachusetts 02172  
ANNUAL REPORT OF THE  
METALS & CERAMICS INFORMATION CENTER  
H. Mindlin, J. F. Lynch, Metals & Ceramics  
Information Center, Battelle-Columbus,  
Columbus, Ohio

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May 1, 1978, to April 30, 1979

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